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ABSTRACT

Short comments introduce each section of this bibliography designed to "introduce the teacher who wishes to do research in some aspects of change in science education to the relevant literature." The emphasis is on science education in England and Wales, but a large number of the entries are of United States origin and concern U. S. curriculum projects or research. Articles were not included in the bibliography unless they were research based or contained opinions which appear to have made a unique contribution to the literature. The following sections are included: guides to sources and bibliographies; models of analyses; methodology and statistics; comparative studies; general and recent references; general references for education in England; studies of change in education--multiple innovations; studies of change in science education, in special programs in education, in social studies education, and in humanities education. The section on multiple innovations is subdivided into historical and case studies; sources of innovation; strategies of development and dissemination; characteristics of innovation; adoption diffusion process; effects; and four sections on the receivers of the innovation: individuals, groups, institutions, and systems and geographic areas. (AL)

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Annotated Bibliography on Change in Education
in England and America with an Emphasis on
Science Education

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A Introduction

The purposes for producing this Bibliography are -

- a. to introduce the teacher who wishes to do research in some aspect of change in science education to the relevant literature,
- b. to provide a basis of sharing recent references of studies on change in education with interested research workers.

The initial emphasis is on science education in England and Wales since this Bibliography developed out of a research project on the adoption and diffusion of Nuffield science schemes in secondary schools. Future supplements will include studies of educational change in the humanities and social sciences.

References collected in other bibliographies, listed in section 1.3, have generally not been included in this Bibliography. The emphasis of this collection is on research studies. Articles which express only opinions on the subject are not included unless they make a unique contribution to the literature.

Interested persons are invited to communicate to the writer references they believe should be included and to comment on the following observations concerning research on change in education.

1. Since 1965 a large body of research on change in education has appeared in America - especially in the form of theses for the Ph.D. or Ed.D degree. This research is largely undocumented and unevaluated. Very few of the theses are listed in the bibliographies under section 1.3.
2. Results of over 100 theses listed in Dissertation Abstracts between 1965-70 are often contradictory partly as a result of the variety of concepts, research designs and statistical analyses used to study change in education. A review of this research is needed to define concepts, to identify valuable contributions and to outline minimum standards of research. The improved communications from such a document would contribute to the value of future research projects.
3. Research on change in education is often based on work in other disciplines. This sometimes results in a misapplication of concepts and statistical analyses. There is also evidence of a lag in methods where investigators in one field may have replaced one form of analysis with another but the old analysis will continue to be used in education for a number of years.
4. Developments in the use of computers for manipulation of data are still largely unavailable to the majority of teachers - as evidenced by the lack of use in published literature.
5. Studies of implementation of specific schemes in science education are just beginning to appear especially in the form of theses such as Kelly, Jenks and Yegge listed in sections 8.0, 8.6 and 8.7.

A basic list of readers with which to begin is listed below. The section in which the full reference information is provided is indicated in brackets.

Baron, G. 1970 (1.1)
 Benne, K.D.; Bennis, W.G.; Chin, R. 1969 (5.0)
 Cooper, J. 1967 (6.0)
 Grobman, A.B. 1969 (8.0)
 Gross, N.; Giacquinta, J.B.; Bernstein, M. 1968 (7.0)
 Havelock, R.G. July, 1969 (1.3)
 Jenkins, E.W. 1971 (8.5)
 Jenks, H.C. 1968 (8.6)
 Katz, M.B. 1971 (5.0)
 Kelly, P.J. 1971 (4.0)
 Kelly, P.J. 1972 (8.4)
 Musgrove, F. 1971 (6.0)
 Nie, N.H.; Bent, D.H.; Hull, C.H. 1970 (3.0)
 Oettinger, A.G. 1969 (5.0)
 Peterson, B.A. 1969 (7.8)
 Schools Council Curriculum Bulletin 3, 1970 (6.0)
 Taylor, P.H. 1970 (6.0)
 Yegge, J.F.; Watson, F.G.; Winter, S.S. 1971 (8.7)

note - "ED" refers to an ERIC REPORT microfiche number

B Sources

1. guides to sources and bibliographies

1.0 statistical sources

In England the most convenient source of educational statistics is the Department of Education and Science (D.E.S.) and these are listed in Government Publications (71). Publication lists from the National Foundation for Educational Research (N.F.E.R.) and Schools Council should also be consulted. Havelock (70) has a useful appendix on major information sources on American education.

D.E.S. Statistics of Education. 1969, 6 volumes. London: H.M.S.O., 1971.

D.E.S. Education and Science in 1970. London: H.M.S.O., April 1971.

D.E.S. Statistics of Education Special Series 1 Survey of the Curriculum and Deployment of Teachers (secondary schools) 1965-66. Part I Teachers. London: H.M.S.O.

D.E.S. Statistics of Education Special Series 2 Survey of In-service Training of Teachers 1967. London: H.M.S.O. 1970.

The Education Authorities Directory and Annual 1971. School Government Publishing Company, Darby House, Bletchingley Road, Merstham, Surrey, England.

The Education Committees Yearbook 1971-72. Councils and Education Press, 10 Queen Anne Street, London, W1M 9LD.

Education Statistics 1969-70. The Institute of Municipal Treasurers and Accountants and Society of County Treasurers, 1 Buckingham Place, London, S.W.1, England.

Government Publications Sectional List No.2 Department of Education and Science. 1971 London: H.M.S.O., P.O. Box 569, SE1 9NH, or U.S.A.: Pendragon House, 899 Broadway Avenue, Redwood City, California 94063.

Harvey, Joan M. Sources of Statistics. London: Clive Bingley, 1969.

National Foundation for Educational Research in England and Wales, 2 Jennings Buildings, Thames Avenue, Windsor, Berkshire, SL4 1QS, England

Havelock, Ronald G. A Guide to Innovation in Education. Center for Research on Utilization of Scientific Knowledge, Institute for Social Research, The University of Michigan, Ann Arbor, Michigan, U.S.A. 1970. (A revised edition will be available mid 1972 from Educational Technology Publication Inc.)

Schools Council, 160 Great Portland Street, London, W1N 6LL, England.

1.1 bibliographical guides

- Baron, George, A Bibliographical Guide to the English Educational System. 3rd ed. Athlone Press, 1970.
- Bristow, Thelma; Holmes, Brian. Comparative Education Through the Literature. A Bibliographical Guide. London: Butterworths, 1968.
- Burke, Arvid J.; Burke, Mary A. Documentation in Education. New York: Teachers College Press, Columbia University, 1967.
- Butcher, H.J. ed. Educational Research in Britain. London: University Press, 1968.
- Department of Education and Science Science Research in British Universities and Colleges 1969-70. Vol. III Social Sciences. London: H.M.S.O. 1970.
- Foskett, D.J. How to Find Out: Educational Research. London: Pergamon Press 1965.
- Higson, C.W.J. "Finding Out About Educational Research" Educational Research II 1968 31-37.

1.2 annual abstracts of articles and research

The following terms were used in the search of subject indices -

adoption
annotated bibliographies
bibliographies
communication
curriculum change

diffusion
educational change
educational innovation
innovation

	<u>Volumes searched</u>
<u>British Education Index</u>	Vol. 6 no. 1 - no. 6
<u>Education Index</u>	Vol. 16 - Vol. 19
ERIC <u>Research in Education</u> (Educational Resources Information Center)	Vol. 1 + Vol. 6 no. 9 (except Vol. 2 no. 5 - no. 7)
<u>Index to Theses Accepted for Higher Degrees in the Universities of Great Britain and Ireland.</u> London: ASLIB.	Vol. 10 - Vol. 18
<u>Psychological Abstracts</u>	not searched
<u>Sociological Abstracts</u>	Vol. 18 no. 5 - Vol. 19 no. 5
<u>Dissertation Abstracts</u> (University Microfilms)	Vol. 25 - Vol. 30

1.3 bibliographies of literature on change

Havelock (68) is the most useful bibliography with 17% of 4,000 references from education. Rogers (68) has nearly 300 references with 7% from education. Unfortunately many bibliographies fail to list microfiche number when documents are available in this form.

Center for Comparative Political Analysis. "Bibliography on planned Social Change - with Special Reference to Rural Development and Educational Development", unpublished report, University of Minnesota, January 1967. ERIC Report ED. 040 110.

Downey, Loren W. "Planned Change: A Selected Bibliography", unpublished report, Council for Educational Administration, University of Columbus, Ohio, 1968. ERIC Report ED. 020 569

Havelock, Ronald G. "Bibliography on Knowledge Utilization and Dissemination" 1968 ERIC Report ED. 029 172, and "A Comparative Study of the Literature on the Dissemination and Utilization of Scientific Knowledge", Center for Research on Utilization of Scientific Knowledge, Institute for Social Research, University of Michigan, July 1969 ED. 029 171.

Havelock, Ronald G. Major Work on Change in Education: An Annotated Bibliography with Author and Subject Indices. Institute for Social Research, University of Michigan, October 1969. This work is also included in Havelock 1970 listed in section 1.0.

Jones, Gwyn E. "The Adoption and Diffusion of Agricultural Practices", World Agricultural Economics and Rural Sociology Abstracts, 2: 3 September 1967 1-34.

Kurland, Norman; Miller, Richard I. "Selected and Annotated Bibliography on the Processes of Change", unpublished paper, 1966 ERIC Report ED. 023 025

Maguire, Louis M. "An annotated bibliography of the literature on change", Philadelphia: Research for Better Schools, Inc. 1970 ED. 043 965. A companion document is "Observations and analysis of the literature on change" ED. 043 066.

Paisley, William J. "Flow of (Behavioral) Science Information: A Review of the Research Literature", Institute for Communication Research, Stanford University, 1966. ERIC Report ED. 039 783.

Piele, Philip K. "Review of Recent Literature on Educational Diffusion Research" National Federation for the Improvement of Rural Education, October 1970. ED. 050 486.

Rogers, Everett M. Diffusion of Innovations. New York: The Free Press 1962.

Rogers, Everett M. "Supplement to Bibliography on the Diffusion of Innovations", unpublished report, Michigan State University, Department of Communication, 1968. ERIC Report ED. 030 056.

Rogers, Everett M.; Shoemaker, Floyd F. Communication of Innovations: A Cross Cultural and Communication Approach. New York: Free Press, 1971.

Rogers, Everett M.; Smith, Leticia. Bibliography of the Diffusion of Innovations. East Lansing: Michigan State University, Department of Communication, Diffusion of Innovation Research Report No. 3, 1965.

Skelton, Gail J.; Hensel, J.W. "The change process in education. A selected and annotated bibliography" Center for Vocational and Technical Education, Ohio State University, 1970. ED. 041 108.

2. models of analysis

Models of analysis have become progressively more complex with their extension into processes over time and two way interaction. This change is related to a decline in influence of the research and development model and increase in the use of systems analysis. Of increasing influence are models based on social interaction and problem solving which emphasize the communication process and relation of an innovation with a particular context. Studies of innovativeness are beginning to consider varying contexts both in time and space and the particular identity of users and their social system. Few studies of curriculum innovation have attempted to place all events in the stages of initiation, development, diffusion, adoption and implementation within one model. One example is Kelly (71). Additional models are found in studies listed in other sections - especially Havelock, R.G. July 1969 (1.0) and Rogers, E.M. 1962 (1.3)

*
Brown, Lawrence A. "Diffusion Dynamics: A Review and Revision of the Quantitative Theory of the Spatial Diffusion of Innovation", unpublished Ph.D. thesis, Northwestern University, 1966. University Microfilm 66-13,958,

Brown, Lawrence. Diffusion Dynamics: A Review and Revision of the Quantitative Theory of the Spatial Diffusion of Innovation. (Lund Spatial Studies in Geography, Series B. No. 29) Lund: Royal University of Lund, Sweden, 1968.

Brown, Lawrence A. "Diffusion of Innovation: A Macroview", Economic Development and Cultural Change, 17:2 (January 1969) 189-211.

Coleman, Robert W. "Kurt Lewin's Theory of Social Change Applied to Curriculum Change". Unpublished Ed.D. thesis, University of Illinois, 1964. University Microfilm 65-3194.

Guba, Egon G. "Methodological Strategies for Educational Change". Unpublished report, November 8-10, 1965, ERIC Report ED. 011 404

Guba, Egon G. "The Place of Educational Research in Educational Change". Unpublished address to the Canadian Council for Research in Education, National Institute for the Study of Educational Change, June 8, 1967, ERIC Report ED. 028 496.

Harrell, Roger L. "A Process Model for Educational Change - Its Development and Use as an Evaluation Instrument". Unpublished Ed.D. thesis, University of New Mexico, 1967. University Microfilm 67-6244.

Hecht, Roger L. "A Morphogenic-Morphostatic Typology of Change Processes". Unpublished Ph.D. thesis, Colorado State University, 1970.

Hoyle, Eric. "How Does the Curriculum Change I. A Proposal for Inquiries" Journal of Curriculum Studies, 1:2 (May, 1969), 132-141.

Hoyle, Eric. "How Does the Curriculum Change II. Systems and Strategies" Journal of Curriculum Studies, 1:3 (November 1969) 330-339.

- Kelly, P.J. "The Process of Curriculum Innovation",
Paedagogica Europaea. Brussels: Agon Elsevier, 1971a.
- Klonglan, Gerald E.; Beal, George M.; Bolen, J.M.; Coward, E.W.
"Conceptualizing and Measuring the Diffusion of Innovations",
Sociologica Ruralis, 11:1 (1971), 38-48
- Lin, Nan. "Innovative Methods for Studying Innovation in
Education and an Illustrated Analysis of Structural
Effects on Innovation Diffusion within Schools". Paper
presented at the National Conference on the Diffusion of
Educational Ideas, Michigan State University. (March 1968)
ERIC Report ED 017 714.
- McNeil, John P. "Forces Influencing Curriculum", Review of
Educational Research, 39:3 (June 1969) 293-318.
- Rogers, Everett M.; Jain, Nemi C. "Needed Research on
Diffusion Within Educational Organization". Unpublished
paper presented at the National Conference on the Diffusion
of Educational Ideas, East Lansing, March 26-28, 1968.
ERIC Report ED 017 740.
- Trow, Martin "Methodological Problems in the Evaluation of
Innovation", Center for the Study of Evaluation Report 31,
University of California, May 1969.
ERIC Report ED 031 820
- * Bernhart, Irwin; Mackenzie, K.D. "Some problems in using
diffusion models for new products". Pennsylvania State
University, Department of Economics, 1970. ED 046 078.

3. methodology, statistics

Nie (70) as well as being a practical manual on the use of a unique computer programme has some of the most readable sections on correlation, multiple-regression, scalogram and factor analysis. An ideal companion book yet to be written would be a critical evaluation, with detailed examples, of actual studies of change in education stressing common errors of design and analysis. Lohnes (70) introduces statistics through the use of computers.

- Alba, Manuel S. "Microanalysis in the Socio-dynamics of Diffusion of Innovation: a Simulating Study". Unpublished Ph.D. thesis, Northwestern University, 1968. University Microfilm 69-1785.
- Campbell, Donald T.; Stanley, J.C. Experimental and Quasi-Experimental Design for Research. Chicago: Rand McNally & Co., 1963.
- Cooley, W.; Lohnes, P. Multivariate Data Analysis. New York: Wiley, 1971.
- Costner, H.L. "Criterion for Measures of Association", American Sociological Review, 30 (1965), 341-353
- Dodd, Stuart C. "Diffusion is Predictable: Testing Probability Models for Laws of Interaction", American Sociology Review, 20:4 (August 1955) 392-401.
- Evans, K.M. Planning Small-Scale Research. National Foundation for Educational Research in England and Wales, 1968.
- Galtung, Johan, Theory and Methods of Social Research. London: Allen & Unwin, 1967.
- Guildford, J.D. Fundamental Statistics in Psychology and Education. 4th ed. New York: McGraw Hill, 1965.
- Lohnes, P.; Cooley, W. Introduction to Statistical Procedures. New York: Wiley, 1970.
- Mason, Robert; Halter, Albert N. "The Application of a System of Simultaneous Equations to an Innovation Diffusion Model", Social Forces, 47:2 (December 1968) 182-195.
- Nie, Norman H.; Bent, Dale H.; Hull, C.H. A Statistical Package for the Social Sciences. New York: McGraw-Hill, 1970.
- Ross, John A.; Bang, Sook; "The AID Computer Programme, Used to Predict Adoption of Family Planning in Koyang", Population Studies, 20:1 (July 1966) 67-75.
- Siegal, Sidney, Nonparametric Statistics for the Behavioral Sciences. New York: McGraw-Hill, 1956
- Stacey, Margaret, Methods of Social Research. London: Pergamon Press, 1969.
- Valkonen, Tapani. "On the Theory of Diffusion of Innovation", Sociologia Ruralis, 102 (1970) 162-170.

Webb, Eugene J.; Campbell, Donald T.; Schwartz, Richard D.
Sechrest, Lee. Unobtrusive Measures. Nonreactive
Research in the Social Sciences. Chicago:
Rand McNally & Co., 1966

White, William J. "Toward the Validation of a Functional
Model of the Adoption-Rejection Process". Unpublished
Ph.D. thesis, Michigan State University, 1967.

Winer, B. Statistical Principles in Experimental Design.
New York: McGraw-Hill, 1971.

4. comparative studies

These references provide an introduction to literature on comparative education for studies including different cultures. Large, intensive and short term studies of change in schools by research teams from another country are just beginning to appear in the literature.

"Adapting British School Reforms to U.S. Needs", School and Society, 98 (January 1970) 16-17.

Baez, Albert V. "Improving the Teaching of Science with Particular Reference to Developing Countries", unpublished report, Advisory Committee on the Application of Science and Technology Development, October 1967. ERIC Report ED 033 050.

Bhola, Harbans S. "A Theory of Innovation Diffusion and Its Application to Indian Education and Community Development", unpublished Ph.D. thesis, Ohio State University, 1965. University Microfilm 66-6230.

Case, John H. Annotated Bibliography on Science and Mathematics Education in Sub-Sahara Africa. Paris: UNESCO. 1970.

Centre for Educational Research and Innovation. "The Nature of the Curriculum for the Eighties and Onwards", ed. by David C. Thomas. English draft. Paris: Organization for Economic Co-operation and Development, December 1970.

Dalin, Per. Innovation in Education - Norway. Paris: Centre for Educational Research and Innovation, Organization for Economic Co-operation and Development, 1971.

Elgayar, Sayed I. M. "The Impact of Modern Democratic Thought on Education with Special Reference to England and the United States", unpublished Ph.D. thesis, Institute of Education, University of London. 1968.

Holmes, Brian. Problems in Education. A Comparative Approach. London: Routledge and Kegan Paul, 1965.

Kelly, P. "Syllabus Reform in Britain and America", Biology and Human Affairs 28:2 (1963) 11-18.

Kelly, P. "Trends in Biological Education - an International Review", Journal of Biological Education 1:1 (1967).

Langeveld, M.J. "Obstacles to Educational Reform in Europe", Paedagogica Europaea 6 (1968)

Maclure, Stuart. Innovation in Education - Sweden. Paris: Centre for Educational Research and Innovation, Organization for Economic Co-operation and Development, 1971.

Rogers, Everett M.; Ascroft, Joseph; Roling, Niels. "Cross-Cultural Generalizations about the Diffusion of Innovation: Research in Brazil, Nigeria, and India". Paper read at the 7th World Congress of the International Sociological Association, 1970. Sociological Abstracts E 4044.

- Rogers, Everett M.; Joyce, Richard E.; Kuo, Jeanne Ching-Chen; Lev, Donald J.; Lin, Nan; Mortimore, Frederick J.; Schwartz, Donald F.; Shoemaker, F. Flood. "Diffusion of Innovation. Educational Change in Thai Government Secondary Schools", Institute for Interrelated Studies in Education and Department of Communication, Michigan State University, 1969. ERIC Report ED 030 501.
- Ryerson, Norman E. "A Comparative Study of Some Problems in Secondary Education in their Relation to School Administration in California and England", unpublished M.A. dissertation, University of London, Institute of Education, 1964.
- Sussmann, Leila. Innovation in Education - United States. Paris: Centre for Educational Research and Innovation, Organization for Economic Co-operation and Development, 1971.
- Thomas, Helga. Innovation in Education - Germany. Paris: Centre for Educational Research and Innovation, Organization for Economic Co-operation and Development, 1971.
- Thomas, R. M.; Sands, Lester B.; Brubaker, Dale L. Strategies for Curriculum Change: Cases from 13 Nations. Pennsylvania: International Textbook Co. 1968.
- Wassef, Wassef A. "A Comparative Analysis of Selected School Textbooks and Major Projects in Science Education in Four Countries in Relation to the Explosion of Scientific Knowledge", unpublished Ph.D. thesis, University of London Institute of Education, 1967.

5. general and recent references

The following sources are a general introduction to literature representing the variety of fields relevant to, or in which studies of change have concepts useful to, education. These sources provide access to the considerable literature on social change.

- Barnes, Louis B. "Organizational Change and Field Experiment Methods", 57-111 in Methods of Organizational Research ed. by Victor H. Vroom, University of Pittsburgh Press, 1967.
- Becker, Marshall H. "Sociometric Location and Innovativeness: Reformulation and Extension of the Diffusion Model", American Sociological Review, 35:2 (April 1970) 267-83.
- Bennis, Warren G.; Benne, Kenneth D.; Chin, Robert (eds) The Planning of Change 2nd ed. New York: Holt, Rinehart & Winston, 1969.
- Browning, Douglas ed. Philosophers of Process. New York: Random House, 1965.
- Burns, Tom; Stalker, George. The Management of Innovation London: Tavistock Pub. 1961.
- Coleman, James S. Medical Innovation. A Diffusion Study. New York: Bobbs-Merrill Co. 1966.
- Cottrell, Fred. "Technological Progress and Evolutionary Theory", in Social Change in Developing Areas - A Reinterpretation of Evolutionary Theory. ed. by H. R. Barringer. Cambridge: Shenkman Pub. Co., 1965 285-318.
- Etzioni, Amitai. Complex Organizations New York: Holt, Rinehart and Winston, 1961.
- Fullan, Michael "A New Look at School Innovativeness", Sociological Abstracts E 9295 1971.
- Fullan, Michael; Spady, W.G. "The Authority System of the School and Innovativeness: Their Reciprocal Relationships", Sociological Abstracts E.9296 1971
- Gross, Beatrice; Gross, Ronald Radical School Reform. New York: Simon and Schuster, 1969.
- Guthrie, James W.; Wynne, Edward eds. New Models for American Education. Englewood Cliff: Prentice-Hall, 1971.
- Hägerstrand, Torsten. Innovation Diffusion as a Spatial Process. Translated by A. Pred. University of Chicago Press, 1967.
- Hagget, P. Locational Analysis in Human Geography. London: Edward Arnold, 1965.
- Jones, Garth N. Planned Organizational Change. London: Routledge and Kegan Paul, 1969.
- Katz, Michael B. Class, Bureaucracy, and Schools: the Illusion of Educational Change in America. New York: Praeger Pub., 1971.
- Katz, Elihu; Levin, Martin L.; Hamilton, Herbert. "Traditions of Research on the Diffusion of Innovation", American Sociological Review, 28 (1963), 237-252.

- Klages, Helmut. "Measuring Social Innovations",
Sociologia Internationalis, 8: 1 (1970) 69-78
- Klapper, Joseph T. The Effects of Mass Communication.
Glencoe Free Press, 1960.
- Krausz, Ernest. Sociology in Britain. A Survey of Research
London: B. T. Batsford, Ltd., 1969.
- Lawler, Marcella R. ed. Strategies for Planned Curricular
Change. New York: Teachers' College Press, 1970.
- Miles, Matthew B. ed. Innovation in Education. New York:
Teachers College Press, Columbia University, 1964.
- Oettinger, Anthony G. Run Computer, Run: The Mythology of
Educational Innovation. Harvard University Press, 1969.
- Presser, H.A. "Measuring Innovativeness Rather than Adoption",
Rural Sociology, 34: 4 (December 1969) 510-527.
- Rogers, Everett M.; Stanfield, J. David. "Adoption and
Diffusion of New Products: Emerging Generalizations and
Hypotheses" pp 227-250 in Applications of the Sciences in
Marketing Management ed. by Frank M. Bass, Charles W. King
and Edgar A. Pessemier. London: J. Wiley & Sons, 1968.
- Schon, Donald A. Beyond the Stable State. London:
Temple Smith, 1970.
- Sewell, William H. "Rural Sociology Research, 1936-1965",
Rural Sociology. 30:4 (December 1965) 428-451.
- Silberman, H.F.; Filep, R.T. "Information Systems
Application in Education", Annual Review of Information
Science and Technology, 368 (1968) 358-395.

6. general references for education in England.

Although there is little literature on diffusion of innovation in education there is considerable discussion on changes which are not directly relevant to American education. With the greater centralization of certain controls in education, topics on external examinations, finances and comprehensive education are subjects of innovation in themselves as well as being important to change in specific fields such as science education. In addition to the sources listed under 1.0, 1.1 and 1.2 the following are useful sources related to science education. Current sources may also be obtained from British publications in education especially The Times Educational Supplement and journals listed in 8.0.

Argles, Michael. South Kensington to Robbins: an Account of English Technical and Scientific Education Since 1851. London: Longmans, 1964.

Association for Science Education, The Teaching of Science in Secondary Schools. 3rd ed. London: John Murray, 1970.

Barr, R. M. ed. Curriculum Innovation in Practice-In Relation to Colleges of Education. London: Edge Hill College of Education, 1969.

Biological Education Committee. Biological Science in Sixth Forms and at Universities in the U.K. London: Royal Society - Institute of Biology, October, 1966.

Birmingham, University of. Report of an Enquiry into the Suitability of the General Certificate of Education Advanced Level Syllabus in Science as a Preparation for Direct Entry into First Degree Courses in the Faculty of Science. Report of the Biology Panel. Birmingham: Hudson & Sons Ltd. 1959.

British Committee on Chemical Education. Teacher Training of Chemistry Graduates. An Enquiry. London: Royal Institute of Chemistry and the Royal Society, 1968.

Cane, Brian. In-service Training. National Foundation for Educational Research in England and Wales, 1969.

Connell, L. "Demonstration and Individual Practical Work in Science Teaching: A Review of Opinions", School Science Review, 52: 180 (March 1971) 692-703.

Cooper, J. "Curriculum Reform in England: The Background to the Schools Council". Unpublished M.A. dissertation, University of London Institute of Education, September 1967.

Corbett, Anne. Innovation in Education - England. Paris: Centre for Research and Innovation, Organization for Economic Co-operation and Development, 1971.

Crossland, R.W.; Amos, R. "Toward New 'O' Level Examinations in Biology", Biology and Human Affairs, 30: 3 (Summer, 1965) 35-39.

Dines, P.M. "Curriculum Change in a Comprehensive School". Unpublished M.Ed. dissertation, University of Bristol, Institute of Education, 1968.

- Eggleston, J.F. A Critical Review of Assessment Procedures in Secondary School Science. University of Leicester, School of Education, 1965.
- Evans, Alex. "Teachers, Trainers and Development Centres", Dialogue, (August 1970) Schools Council Newsletter 6.
- Georgiades, N.J. "A Study of Attitudes of Teachers to Educational Innovation". Unpublished M.A. dissertation, Birkbeck College, University of London, 1967.
- Gray, Malcolm. "Education Expenditure and Local Authority Discretion". Unpublished M.Ed. dissertation, Manchester University, 1965.
- Holly, Douglas. Society, Schools and Humanity - the Changing World of Secondary Education. London: MacGibbon & Kee, 1971.
- Hucker, James. "A Comparative Study of the Part that Science Plays in the Training of Teachers for the Primary Stage of Education - Some Methodological Considerations". Unpublished M.A. dissertation, University of London, 1966.
- "Innovations in Education", Forum for the Discussion of New Trends in Education, 14: 2 (Spring 1972) Leicester, England: P.S.W. Publications, 11 Pendene Road, LE2 3DQ.
- International Union of Pure and Applied Chemistry, Committee on the Teaching of Chemistry. "The Effect of Examinations in Determining the Chemistry Curriculum up to the Level of University Entrance", Pure and Applied Chemistry, 11 (1965), 583-632
- Kelly, P.J. "Biology in the Sixth Form", Science in the Sixth Form - Schools Council Working Paper 4. H.M.S.O. 1966.
- Kerr, J.F. Practical Work in School Science. Leicester University Press, 1963.
- Kerr, J.F. ed. Changing the Curriculum. London University Press, 1968.
- McCleverty, G.A. "The Impact of the G.C.E. Examination on the Secondary Modern School". Unpublished M.A. dissertation, Birmingham University, 1963.
- McLeish, John. Teachers' Attitudes: A Study of National and Other Differences. Cambridge Institute of Education, 1969.
- Male, George A. "A Central Control of Education in England", Education and Urban Society, 1: 3 (May 1969) 315-324
- Musgrove, Frank. Patterns of Power and Authority in English Education. London: Methuen & Co. Ltd., 1971.
- Owen, J.G. "Strategies of Curriculum Innovation", Journal of Curriculum Studies, 1: 1 (November 1968) 19-25.
- Owen, J.G. "Administration and Curriculum Change", in G. Baron; W. Taylor eds. Educational Administration and the Social Sciences. University of London: Athlone Press, 1969

- Richmond, W. Kenneth. The Teaching Revolution. London: Methuen & Co. 1967.
- Schools Council Curriculum Bulletin 3. Changes in School Science Teaching. London: Evans/Methuen Educational Ltd. 1970.
- Schools Council. Foundation Stones 1966-8: An Account by the Field Officers of the First Two Years' Work of Local Curriculum Development Groups in a County Authority. Pamphlet 3. London: Schools Council, 1969.
- Schools Council. Teachers' Centres and the Changing Curriculum. Pamphlet 6. London: Schools Council, 1970.
- Shipman, M.D. "Personal and Social Influences on the Work of a Teacher Training College". Unpublished Ph.D. thesis, University of London, 1965.
- Smith, M.P. "Curriculum Change at the Local Level", Journal of Curriculum Studies, 3: 2 (November 1971) 158-162.
- Snobeck, Phillip E. "A History of British Comment on American Education from 1944 Through 1960". Unpublished Ed.D. thesis, University of California, L.A. 1964. University Microfilm 64-9796.
- Stenhouse, D. "Examinations 'Selection Pressures' in Biology", Journal of Biological Education, 3 (1969) 221-234.
- Swift, Donald F.; Acland, Henry. "The Sociology of Education in Britain, 1960-1968: A Bibliographical Review", Social Science Information 8: 4 (August 1969) 31-64.
- Taylor, Philip H. How Teachers Plan their Courses. Berkshire, England: National Foundation for Educational Research in England and Wales, 1970.
- Vaizey, J. The Control of Education, London: Faber & Faber, 1963
- Wolf, Richard. "The Quiet Revolution", Journal of Curriculum Studies, 3: 2 (November 1971) 113-118

7. studies of change in education - multiple innovations

The classification of receivers or users of an innovation is based on the definition of unit of adoption used in this study. In education the most commonly used unit is the school in which "innovativeness" may be determined by a variety of methods such as nomination by panels or individuals or by "self-reported" use of a variety of innovations. Innovative schools or systems may be then compared by variables which are indicated by the following classification:

- a. individual teacher variables - personality, attitudes, age, experience.
- b. individual administrator variables (as in a. above) and administrative variables - finances, organizational characteristics.
- c. pupil characteristics
- d. combinations of a. - c.
- e. system variables - community characteristics, government programmes.

7.0 historical and case studies

- Evans, Richard I. Resistance to Innovation in Higher Education. A Social Psychology Experiment Focused on Television and the Establishment. San Francisco: Jossey-Bass Inc. 1967.
- Gittell, Marilyn; Hollander, T.E. Six Urban School Districts: A Comparative Study of Institutional Response. London: Fredrick A. Prager, 1968.
- Gross, Neal; Giacuinta, Joseph B.; Bernstein, Marilyn. "An Attempt to Implement a Major Educational Innovation. A Sociological Inquiry". 1968 ERIC Report ED 032 649. (Also published as Implementing Organization Change, 1971 Harper and Row.)
- Kalapos, Stephen A. "An Historical Study of Curriculum Development for American Public Education by National and Regional Organizations: 1892-1965". Unpublished Ed.D. thesis, Temple University, 1968. University Microfilm 69-14,092.
- Katz, Michael B. Class, Bureaucracy, and Schools: the Illusion of Educational Change in America. New York: Prager Pub., 1971.
- Montague, David O. "The Association of Curriculum Change with the Unification of California School Districts". Unpublished Ed.D. thesis, University of California, Berkeley 1969. University Microfilm 69-18,869.
- Morphet, Edgar L; Ryan, C.O. Designing Education for the Future. Five volumes. New York: Citation Press, 1967-68.
- New England Educational Assessment Program. "Innovative Practices in New England Schools". August 1969, ED 044 331.

7.1 source of innovation

- Arnold, Daniel S. "The Relation of Source of Introduction to the Adoption of Selected Educational Practices by Vocational Education Teachers". Unpublished Ed.D. thesis, University of Tennessee, 1968. University Microfilm 69-14,611.
- Bradley, Larry G. "Preferences of Selected Ohio County Educators on the Innovative and Non-Innovative Characteristics of Secondary Principals". Unpublished Ph.D. thesis, Ohio State University, 1969. University Microfilm 70-4728.
- Gottlied, David; Brookover, Wilbur B. "Social Factors in the Adoption of New Teaching-Learning Techniques in the Elementary School. Acceptance of New Education Practices by Elementary School Teachers". Unpublished report, College of Education, University of Michigan, 1966. ERIC Report ED 011 958.
- Rice, Robert J. "Role Understanding and Role Acceptance in Curriculum Decision-Making and their Affect upon Curriculum Change in School Organization". Unpublished Ed.D. thesis, Colorado State University, 1967. University Microfilm 67-1129.
- Schulman, Hugh S. "The Initiation of Change by Principals in the Elementary Schools of Nassau and Suffolk Counties, New York". Unpublished Ph.D. thesis, New York University, 1968. University Microfilm 68-11,807.

7.2 strategy of development and dissemination

- Comstock, George A. "Gaining Compliance for Educational Change from Teachers in a Developing Country". Unpublished Ph.D. thesis, Stanford University, 1967. University Microfilm 68-6403.
- Davidson, Shirley M. "Development of a Program of Supervision for Implementing Non-Graded Classroom Practices". Unpublished Ph.D. thesis, University of Pittsburgh, 1968. University Microfilm 68-14,858.
- Duncan, Thomas R. "A Study of Innovative and Non-Innovative Principals and their Use of Information Sources in Curriculum Decision Making". Unpublished Ph.D. thesis, University of Iowa, 1968. University Microfilm 69-8729.
- Eye, Glen G. "Relationship Between Instructional Change and the Extent to which School Administrators and Teachers Agree on the Location of Responsibility for Administrative Decision". Unpublished report, University of Wisconsin, 1966. ERIC Report ED 010 166.
- Hardenbrook, Robert F. "Identification of Process of Innovation in Selected Schools in Santa Barbara County". Unpublished Ed.D. thesis, University of Southern California, 1967. University Microfilm 68-1192.

- Kreskey, Joseph A. "A Critical Review of Procedures in Organizing for Curriculum Improvement in High Schools". Unpublished Ed.D. thesis, New York University, 1967. University Microfilm 68-4813.
- Norris, Audrey B. "An Analysis of Selected Curriculum-Change Agents in Developing a Model of Curriculum Change". Unpublished Ed.D. thesis, Case Western Reserve, 1969. University Microfilm 70-4963.
- Reynoldson, Roger L. "The Interrelationships Between the Decision-Making Processes and the Innovativeness of Public Schools". Unpublished report, Utah State University, Department of Educational Administration, 1969. ERIC Report ED 035 101
- Sargent, Harold R. "A Test of Motivational Appeals Judged Effective by Chief School Administrators to Induce Teachers Acceptance of Educational Innovation". Unpublished Ed.D. thesis, Pennsylvania State University, 1965. University Microfilm 66-4849.

7.3 characteristics of the innovation

- Atkin, J. Myron. "Behavioral Objectives in Curriculum Design: A Cautionary Note", The Science Teacher, (May 1968) 27-30. Reprinted in Readings in the Philosophy of Education: a Study of Curriculum. ed. by Jane R. Martin. Allyn & Bacon, 1970.
- Biddle, Bruce J.; Rossi, Peter H. "Educational Media, Education and Society" 2-45 in The New Media and Education ed. by Peter H. Rossi and Bruce J. Biddle. Chicago: Aldine Pub. Co. 1966.
- Stufflebeam, Daniel L. ed. Ohio Educational Innovations Survey: Catalog of Educational Changes in Ohio Public Schools. Ohio State University, College of Education, 1966.

7.4 adoption diffusion process

- Kohl, John W. "Adoption Stages and Perceptions of Characteristics of Educational Innovations". Unpublished Ed.D. thesis, University of Oregon, 1966. University Microfilm 67-6208.
- LaMar, Ronald V. "In-service Education Needs Related to the Diffusion of an Innovation". Unpublished Ed.D. thesis, University of California, Berkeley 1966. University Microfilm 67-4973.
- Medeiros, Joseph V. "A Stage-Process Analysis of the Adoption of Innovational Programs in Selected Public Secondary Schools". Unpublished Ed.D. thesis, Boston University School of Education, 1967. University Microfilm 69-7820.
- Pastre, John A. "Adoption of Innovations: Sources and Channels of Information Used by Elementary School Principals". Unpublished Ed.D. thesis, Cornell University, 1968. University Microfilm 69-8860.

Reid, Isaiah. "Diffusion of Innovation in Elementary Schools: A Study of the Primary Sources of Information Used by Teachers". Unpublished Ed.D. thesis, Cornell University, 1969. University Microfilm 70-529.

7.5 receivers - individuals

a. teacher variables

Jenkins, John M. "A Study of the Characteristics Associated with Innovative Behavior in Teachers". Unpublished Ed.D. thesis, University of Miami, 1967. University Microfilm 67-9237.

Kardas, Barbara J. D. "Characteristics of Teacher Participants in Curricular Planning Activities and Reported Acts of Implementation". Unpublished Ph.D. thesis, Northwestern University, 1969. University Microfilm 70-83.

Kerelejza, Joan D. "The Relationship of Closed and Open Mindedness to Factors that Selected Groups of Teachers Regard as Barriers to Curriculum Change". Unpublished Ph.D. thesis, University of Connecticut, 1967. University Microfilm 68-1365.

Krey, Robert D. "Factors Relating to Teachers' Perceptions of Curricular Implementation Activities and the Extent of Curriculum Implementation". Unpublished Ph.D. thesis, University of Wisconsin, 1968. University Microfilm 69-946.

b. administrative variables

Doughty, Billie M. "Some Factors Affecting Innovation as Identified in Educational Literature and as Perceived by Selected Teachers". Unpublished Ed.D. thesis, University of Alabama, 1966. University Microfilm 67-1284.

Lawrence, Clifford J. "Personality Characteristics of School Superintendents who Implement Innovation in the Public Schools". Unpublished Ed.D. thesis, Utah State University, 1968. University Microfilm 68-13,753.

McCormick, Robert W. "The Role of the Principal in the Improvement of Instruction in Small Iowa High Schools". Unpublished Ed.D. thesis, University of Nebraska Teachers College, 1968. University Microfilm 68-18,052.

d. combined variables

McDonell, Kenneth A. "Innovation as a Factor in Teacher Attitudes and Performance". Unpublished Ed.D. thesis, Stanford University, 1968. University Microfilm 68-11380.

Van Alfen, Curtis N. "A Study to Develop an Instrument Measuring the Perception of Educators and Teachers as it Relates to Innovative Transitional, or Traditional Educational Environments". Unpublished Ed.D. thesis, University of Utah, 1967. University Microfilm 67-12,215.

7.6 receivers - groups

a. teacher variables

Edmonds, Bernyce S. "The Diffusion of Institute Concepts Beyond the Participants of an NDEA Institute in Critical and Appreciate Reading". Unpublished Ph.D. thesis, Michigan State University, 1968. University Microfilm 69-11,091.

Kline, Charles E. "Leader Behavior, Curricular Implementation and Curricular Change". Unpublished Ph.D. thesis, University of Wisconsin, 1969. University Microfilm 69-9693.

Marshall, Leo W. "Identifying Changes Effected by National Science Foundation Participants in Local Title III, National Defense Education Act Programs in Indiana". Unpublished Ed.D. thesis, Indiana University, 1964. University Microfilm 65-402.

b. administrative variables

Henderson, Donald R. "A Study to Determine the Personality Characteristics of Innovative Educational Administrators and Educational Administrators in Illinois and Indiana". Unpublished Ed.D. thesis, Indiana University, 1968. University Microfilm 69-6740.

7.7 receivers - institutions

b. administrative variables

Addis, Winston C. "An Analysis of the Perceptions of Principals of High and Low Innovative Schools". Unpublished Ph.D. thesis, University of Iowa, 1968. University Microfilm 68-16,771.

Bell, Thomas O. "A Study of Personality Characteristics of School Superintendents in Relation to Administrative Behavior". Unpublished Ed.D. thesis, Utah State University, 1967. University Microfilm 68-13,767.

Curie, Craig H. "Secondary School Principals' Assessment of the Importance of Personal and Situational Factors in the Adoption of Innovations". Unpublished Ed.D. thesis, University of Oregon, 1966. University Microfilm 66-8065.

Elliott, Arthur H. "An Investigation of School Organization Variables and their Relation to the Principal's Receptivity to Innovation: An Exploratory Study". Unpublished Ed.D. thesis, University of California, Berkeley, 1967. University Microfilm 67-11,582.

Hinman, Edna F. "Personality Characteristics of Clark County School Districts Principals Related to the Degree of their Implementation of Innovation". Unpublished Ed.D. thesis, Utah State University, 1967. University Microfilm 70-2448.

- Knedlik, Stanley M. "The Effect of Administrative Succession Pattern Upon Educational Innovation in Selected Secondary Schools". Unpublished Ed.D. thesis, New York University, 1967. University Microfilm 68-6182.
- List, Marilyn K. "A Study of the Relationship between Twenty-Seven Educational Innovations and Accreditation of Public Schools". Unpublished Ph.D. thesis, New York University, 1969. University Microfilm 70-736.
- Mims, Crawford J. "Attitudes of Arkansas School Administrators Toward the Adoption or Rejection of Innovation in Education". Unpublished Ed.D. thesis, University of Arkansas, 1968. University Microfilm 68-15,590.
- Ramer, Burton. "The Relationship of Belief Systems and Personal Characteristics of Chief School Administrators and Attitudes Toward Educational Innovation". Unpublished Ed.D. thesis, State University of New York, Buffalo, 1968. University Microfilm 68-13237.

d. combined variables.

- Carswell, Evelyn M. "Trends in Educational Innovation in Arizona Elementary Schools Between 1960 and 1966". Unpublished Ed.D. thesis, University of Arizona, 1968. University Microfilm 69-5416.
- Chester, Mark A. "Social Structure and Innovation in Elementary Schools". Unpublished Ph.D. thesis, University of Michigan, 1966. University Microfilm 67-8227.
- Hanson, John O. "A Descriptive Study of Basic Data and the Educational Innovations Found in Twenty-two Selected North Dakota Small Schools". Unpublished Ed.D. thesis, University of North Dakota, 1966. University Microfilm 66-12,538.
- Hawkins, Wilber D. "Some Factors which Contribute to Successful Educational Innovation". Unpublished Ed.D. thesis, University of Southern California, 1968. University Microfilm 68-7184.
- House, Ernest and others "The Development of Educational Programs: Advocacy in a Non-national System". Centre for Instructional Research and Curriculum Evaluation, Illinois University, November 1970, ED 045606
- Jacobs, Jan W. "Leadership, Size and Wealth, as Related to Curricular Innovations in the Junior High School". Unpublished Ph.D. thesis, University of Michigan, 1965. University Microfilm 66-6624.
- Kahn, Anwar K. "Adoption and Internalization of Educational Innovations among Teachers in the Pilot Secondary Schools of West Pakistan". Unpublished Ph.D. thesis, Michigan State University, 1968. University Microfilm 69-5894.
- Kunzler, William J. "A Study of Factors that Facilitate and Inhibit Instructional Change as Perceived by Principals". Unpublished Ph.D. thesis, University of Iowa, 1968. University Microfilm 68-16,825.
- LaPlant, James C. "School District Innovativeness and Expectations for the School Board Role". Unpublished Ph.D. thesis, University of Wisconsin, 1966. University Microfilm 66-13,425.

- Leas, Albert. "A Study to Determine the Characteristics of Innovative and Traditional Educators". Unpublished Ed.D. thesis, Indiana State University, 1965. University Microfilm 65-14,052.
- Marcum, Regio L. "Organizational Climate and Adoption of Educational Innovations". Unpublished Ed.D. thesis, Utah State University, 1968.
- Moreton, Ross E. "The Diffusion of Certain Instructional Innovations in the Public Schools of Mississippi: 1958 to 1966". Unpublished Ed.D. thesis, University of Mississippi, 1968. University Microfilm 69-3965.
- Mortimore, Frederic J. "Diffusion of Educational Innovations in the Government Secondary Schools of Thailand". Unpublished Ph.D. thesis, 1968. University Microfilm 68-17,113.
- Pafford, William N. "Relationships Between Innovation and Selected School Factors". Unpublished Ph.D. thesis, University of Kentucky, 1967. University Microfilm 69-15,481.
- Peach, Samuel W. "Relationships Between Certain Factors in the Role of the School Principal and the Adoption of Innovative Instructional Practices". Unpublished Ed.D. thesis, 1967. University Microfilm 68-9320.
- Peterman, Lloyd E. "The Relationship of In-service Education to the Innovativeness of the Classroom Teacher in Selected Public Secondary Schools in Michigan". Unpublished Ph.D. thesis, University of Michigan, 1966. University Microfilm 67-1788.
- Rogers, Everett, M.; Svenning, Lynne. "Change in Small Schools", Unpublished paper presented at the National Working Conference on Solving Educational Problems in Sparsely Populated Areas, May 1969. ERIC Report ED 029 749.
- Salmon, Vincent M. "The Retention or Abandonment of Educational Innovations in Selected Arizona High Schools". Unpublished Ed.D. thesis, University of Arizona, 1969. University Microfilm 69-18,388.
- Scofield, Bill H. "A Study of Innovative Practices in Selected Comprehensive High Schools in Kansas". Unpublished Ed.D. thesis, 1969. University Microfilm 69-21,480.

e. system variables

- Bennett, Robert E. "An Analysis of the Relationship of Organizational Climate to Innovations in Selected Secondary Schools of Pennsylvania and New York". Unpublished Ed.D. thesis, Pennsylvania State University, 1968. University Microfilm 69-14,489.
- LaMantia, Gerald P. "Innovation, Adoption and Organizational Climate: their Relationship to the Job Satisfaction of High School Teachers". Unpublished Ed.D. thesis, New York University, 1969. University Microfilm 70-766.

7.8 receivers - systems

- Bickert, Roderick N. "Selected Organizational Values and Characteristics of Innovative and Non-Innovative School Systems". Unpublished Ph.D. thesis, University of Iowa, 1967. University Microfilm 67-9042.
- Breivogel, William F. "The Relationship of Selected Variables to the Introduction of Educational Innovations in New Jersey Public School Districts". Unpublished Ed.D. thesis, Rutgers State University, 1967. University Microfilm 67-14,416.
- Childs, John W. "A Study of the Belief Systems of Administrators and Teachers in Innovative and Non-Innovative School Districts". Unpublished Ph.D. thesis, Michigan State University, 1965. University Microfilm 66-6109.
- Grout, Stanley A. "Perceptions of Educational Opinion Leaders Concerning Concepts Conducive or Inimical to Educational Innovation". Unpublished Ed.D. thesis, University of Montana, 1969. University Microfilm 69-20,101.
- Heisler, Daniel P. "A Study of Factors that Affect Change in Educational Systems". Unpublished Ph.D. thesis, Ohio State University, 1968. University Microfilm 69-4901.
- Hilfiker, Leo R. "Organization Climate and Adoption of Educational Innovations". Unpublished Ph.D. thesis, University of Wisconsin, 1968. University Microfilm 69-931.
- Hilfiker, Leo R. "The Relationship of School System Innovativeness to Selected Dimensions of Interpersonal Behavior in Eight School Systems". Unpublished report, Research and Development Center for Cognitive Learning, University of Wisconsin, Technical Report 70, January 1969. ERIC Report ED 029 808.
- Hoehn, Lilburn P. "The Regional Educational Laboratories as Change Agents". Unpublished Ph.D. thesis, Michigan State University, 1967. University Microfilm 68-7902.
- Hughes, Larry W. "The Organizational Climate Found in Central Administrative Offices of Selected Highly Innovative and Non-Innovative School Districts in the State of Ohio". Unpublished Ph.D. thesis, Ohio State University, 1965. University Microfilm 66-6267.
- Kendig, Thomas E. "An Analysis of the Relationship of Certain Educational Conditions to Curriculum Breadth and Innovation in Selected Pennsylvania School Systems". Unpublished Ed.D. thesis, Pennsylvania State University, 1965. University Microfilm 66-4822.
- Klingenberg, Allen J. "A Study of Selected Administrative Behaviors Among Administrators from Innovative and Non-Innovative Public School Districts". Unpublished Ph.D. thesis, Michigan State University, 1966. University Microfilm 67-1647.
- Lindsey, Robert L. "The Nationalizing Effect of Federal Influences in Curriculum Decisions in Secondary History and Sociology". Unpublished Ph.D. thesis, Case Western Reserve, 1969. University Microfilm 70-4954.

- Peterson, Barbara A. "Adoption of Educational Innovations: A Social System Approach". Unpublished Ed.D. thesis, University of California, Los Angeles, 1969. University Microfilm 69-17,564.
- Reese, William M. "A Study of the Differences in Role Perception of Educators in a Highly Innovative Educational Environment as Compared with Educators in Less Innovative Educational Environments". Unpublished Ed.D. thesis, University of Utah, 1967. University Microfilm 67-17,559.
- Richland, Malcolm. "A Study to Define an Operational Index of Innovation for School Administrators". Unpublished Ed.D. thesis, University of Southern California, 1968. University Microfilm 68-17,040.
- Roosa, Jack L. "A Study of Organizational Climate, Leader Behavior, and their Relation to the Rate of Adoption of Educational Innovations in Selected School Districts". Unpublished Ed.D. thesis, State University of New York, Albany, 1968. University Microfilm 69-6694.
- Spencer, Eugene N. "Variables Affecting the Adoption Rates of Educational Innovations in Selected School Districts of Oakland County, Michigan". Unpublished Ed.D. thesis, Wayne State University, 1967. University Microfilm 68-2112.
- Sullivan, L. M. "A Study of the Attitude of School Boards and Superintendents and their Relationship to Innovation in Select Oklahoma Schools". Unpublished Ed.D. thesis, Oklahoma State University, 1968. University Microfilm 69-14,344.
- Young, Madge A. "The Influences Affecting Curriculum Change in Selected Educational Agencies Employing Consultants in the Social Sciences Through NDEA Title III-3". Unpublished Ed.D. thesis, University of the Pacific, 1969. University Microfilm 69-18,326.

7.9 effects

- Agger, Robert E.; Goldstein, Marshall N. "Educational Innovation in the Community". Unpublished report, University of Oregon, 1965. ERIC Report ED 010 164.
- Miles, Matthew B. "The Development of Innovative Climates in Educational Organizations". Unpublished report, 1968. ERIC Report ED 030 971.
- Watson, Goodwin. "Resistance to Change", in Concepts for Social Change. Ed. by Goodwin Watson. Co-operative Project for Educational Development Series, Vol. 1. Washington: National Training Laboratories, National Education Association, 1966.
- Weiss, John P. "Awareness of Change: A Study of Factors Related to Knowledge of Educational Innovation". Unpublished Ph.D. thesis, Yale University, 1967. University Microfilm 68-6869.

8. studies of change in science education

The earliest sources of information on curriculum development projects in England and America are the newsletters and bulletins published by the individual projects. Unfortunately the issues go out of print and most are not available on microfiche.

The most comprehensive guide to science curriculum projects, including mathematics and the social sciences, is edited by Lockard (70). The reader unfamiliar with American education may find it difficult to distinguish the more important projects within the 115 listed for the United States alone. By omitting projects which are obviously regional or instituted by a commercial interest this list becomes much smaller. By including only projects which produce curriculum materials for teachers and which have been the subject of at least five articles in teacher journals (reported in Lockard) the list narrows to 16 projects. Most of the following projects are known by their initials (given in brackets) in American education:

Anthropology Curriculum Study Project (ACSP)
 Biological Sciences Curriculum Study (BSCS)
 Chemical Educational Materials Study (CHEMS)
 Conceptually Oriented Program in Elementary Science (COPES)
 Earth Science Curriculum Project (ESCP)
 Elementary Science Study (ESS)
 Harvard Project Physics (HPP)
 High School Geography Project of the Association of American Geographers (HSGP)
 Idea Centered Laboratory Science (I-CLS)
 Introductory Physical Science (IPS)
 Minnesota Mathematics and Science Teaching Project (MINNEMAST)
 Physical Science for Nonscience Students (PSNS)
 Science-A Process Approach (AAAS)
 Science Curriculum Improvement Study (SCIS)
 Secondary School Science Project (SSSP)
 Social Studies Curriculum Project (SSCP)

A few additional projects are no longer producing materials, such as Chemical Bond Approach (CBA) and Physical Science Study Committee Physics (PSSC). The above list includes most of the national projects which are likely to have an influence on science teaching in America. Local projects are quite likely to have more influence in their area but are not considered in this bibliography. In England most of the curriculum development has been financed by the Nuffield Foundation and the Schools Council. Much of the materials which appear in project newsletters is published within a short time in science education journals. Reading through these journals gives one aspect of an historical account of the initiation, development, diffusion and implementation of a particular scheme.

For schemes under the Nuffield Project most articles appear beginning in 1965 in five journals.

Education in Chemistry

Physics Education

Education in Science

The School Science Review

Journal of Biological Education

The British Council publication Science Education Newsletter begun in 1967 is also a valuable source (available from the Science Department, The British Council, 59 New Oxford Street, London, WC1A 1BP)

For American sources, most of the projects listed by Lockard give a list of published articles which indicates the relevant journals to read. Few of the projects have produced a bibliography such as BSCS or AAAS which are available directly. Most of the bibliographies available in science education have been produced by ERIC.

In this Bibliography sources concern the entire process of science curriculum innovation or which focus on the process of change in quantitative or case studies are emphasized. These studies often have a comparative aspect in which the new scheme is compared with an old scheme. The adopting unit may be an individual teacher, a school, a school system or Local Education Authority, a geographical area or an entire country. A large number of articles published may describe important aspects of a project which affect adoption. Examples are Studies which evaluate the effectiveness of a single scheme, e.g. what pupils learn, or which describe historical aspects of the project or events leading up to initiation. These articles are usually included in the bibliographies of studies of the adoption of a particular scheme. In this Bibliography recent articles relating to science education in England are emphasized.

When the name of a specific project is not evident in the title the initials of specific projects are included in brackets.

8.0 historical and case studies (including bibliographies)

ERIC Special Bibliography Series, "Pacesetter in innovation", Bibliography 3, August 1970. ED 050 937.

Grobman, Arnold B. The Changing Classroom: The Role of the Biological Sciences Curriculum Study. New York: Doubleday & Co., 1969.

Kelly, P. J. "Curriculum Development and the Curriculum Mechanism: An Account of the Nuffield A-level Biology Project in Relation to the Concept of the Curriculum Mechanism". Unpublished Ph.D. thesis, Chelsea College, University of London, 1971b.

Lockard, J. D. Seventh Report of the International Clearinghouse in Science and Mathematics Curricular Developments, 1970. University of Maryland, 8th edition late 1972.

Mikhail, Nazmy Hanna. "The Contribution of the British Association for the Advancement of Science to Education in England and Selected Countries Abroad". Unpublished Ph.D. thesis, University of London, Institute of Education, 1964.

Schools Council, Science in the 6th Form. Working Paper 4. London: HMSO, 1966.

Theiss, Frances C. "Science and Mathematics for Young Children: an Annotated Bibliography". Special bibliography series, Bibliography 4, August 1970. ED 050 938.

Youakim, Paulos R. "A Critical Survey of the Teaching of Biology in English Grammar Schools Since 1945". Unpublished M.S. dissertation, Sheffield University, 1966.

8.1 source of innovation

Amos, R. "Teachers' Opinions about the Place of Scientific Method in Biology Courses Leading to the General Certificate of Education Examinations of Ordinary Level". Unpublished M.Ed. dissertation, University of Manchester, 1967.

Amos, R. "What is the Place of Scientific Method in O-level Biology Courses". Journal of Biological Education, 4 (1970), 87-95.

Richman, Paul T. "The Effect of Prestige Suggestions on Science Teachers' Acceptance of New Curriculum". Unpublished Ed.D. thesis, Stanford University, 1963. University Microfilm 64-5564.

8.2 strategies of development and dissemination

Adelson, Nancy C. The American Government Information Unit: A pilot program to improve information flow between research and development and practice in education. Final report. Berkeley, California: Far West Laboratory for Educational Research and Development, January 1971. ED 051 065.

Day, David E.; George, Louise Y. "Effecting Change in Inner City Schools: some Reflections", Journal of Negro Education. 39: 1 (Winter 1970) 4-13. (AAAS)

Department of Education and Science, Royal Society Joint Committee on In-Service Training for School Teachers of Science and Mathematics in England. London: The Royal Society, 1965

James, Margaret A. "The Development of an Evaluative Instrument for Selecting Innovations and the Testing of this Instrument by Comparing the Operational Objectives of the Science Framework for California Public Schools and the Stated Objectives of Introductory Physical Science". Unpublished Ph.D. thesis, Michigan State University, 1968. University Microfilm 69-11,109.

Mahan, James M. "Overview of a systematic effort to engineer and monitor curriculum change: emerging guidelines and encouraging findings for curriculum installers". Paper read at AERA conference, February 1971, ED 047 367 (AAAS)

Marsh, Paul G. "Wellsprings of Strategy: Considerations affecting Innovations by the PSSC" in Innovation in Education ed. by Matthew B. Miles. New York: Bureau of Publications, Teachers College Press, Columbia University, 1964. (PSSC)

Mechling, Kenneth R. "A strategy for stimulating the adoption and diffusion of science curriculum innovations among elementary school teachers". Pennsylvania: Clarion State College, 1969. ED 041 772.

Nicodemus, R.B. "The 'Pygmalion' Effect in Science Curriculum Implementation". Unpublished report, 1969. ERIC Report ED 033 867 (ESS)

8.3. characteristics of the innovation

Comber, L. C. "The Biological Science Curriculum Study Materials". Institute of Biology Journal, 11: 3 (1964)

Dowdeswell, W.H. "The Nuffield Biology Project at O-level", Journal of Biological Education, 1 (1967), 29-37.

Dowdeswell, W.H.; Ellis, A.; Gray, J.H.; Kelly, P.J.; Lister, R.E.; "A Modern Biology Syllabus at O-level", Journal of Biological Education, 4 (1970) 205-217

Hogg, M.E. "The Nuffield O-level Biology Project, Examination and Teachers in Training", Journal of Biological Education, 2 (1968) 219-221.

Kelly, P.J.; Dowdeswell, W.H. "The Nuffield A-level Biological Science Project". Journal of Biological Education, 4: 2 (1970)

Kelly, P.J.; Lister, R.E. "Assessing practical ability in Nuffield A-level Biology in Studies in Assessment ed. by J. F. Eggleston and J.F. Kerr. London: English Universities Press, 1969.

"Nuffield Science Teaching Project". Education in Science, 32 (April 1969) 20-23.

Ongley, P.A. "The Case Against Nuffield". Higher Education Journal, 17: 3 (19) 3-5.

Prosser, Peter J. "Structuring in the Teaching of Science to Secondary School Pupils of Average and less than Average Ability". Unpublished M.Ed. dissertation, University of Bristol, 1968.

Tracey, G.W. "Some Difficulties Involved in Relating Examinations to the Ideals of a New Advanced-level Biology Syllabus". Journal of Biological Education, 1 (1967) 243-249.

8.4 adoption diffusion process

Kelly, P.J. "Adoption and Diffusion of Some Nuffield O-level Science Projects". Centre for Science Education, Chelsea College, London. (1972)

Whitehand, J.W.R. "In-words outwards: the diffusion of the 'new' geography, 1968-70". Area (Institute of British Geographers) 3: 3 (1971) 158-163.

8.5 receivers - individuals

- Blankenship, Jacob W. "An Analysis of Certain Characteristics of Biology Teachers in Relation to their Reactions to the BSCS Biology Program". Unpublished Ph.D. thesis, University of Texas, 1964. University Microfilm 64-11,779.
- Butler, Clyde E. "An Analysis of the Patterns of Academic Preparation of High School Biology Teachers in Relation to their Attitudes toward the BSCS Biology Program". Unpublished Ed.D. thesis, Oklahoma State University, 1968. University Microfilm 69-14,230.
- Coley, John W. "The Biological Sciences Curriculum Study: Its Present Status as Perceived by Certain Biology Teachers in Florida High Schools". Unpublished Ed.D. thesis, Florida State University, 1966. University Microfilm 67-287.
- Jenkins, E.W. "The Attitude of Teachers to the Introduction of Nuffield Chemistry". School Science Review, 49: 167 (November 1967) 231-242.
- Jenkins, E.W. "The Implementation of Curriculum Development Projects". School Science Review, 53: 182 (September 1971) 203-208.
- Meyer, G.R. "Pupils' reactions to trial editions of Nuffield 'O'-level science materials in 1966". Australia: Macquarie University, 1969. ED 046 683.
- Sadler, Paul M. "Teacher Personality Characteristics and Attitudes Concerning PSSC Physics". Journal of Research on Science Teaching, 5 (1968), 28-42.

8.6 receivers - groups

- Dean, R.A. "Changes in Attitudes toward Science by Elementary School Teachers and their Pupils Following an In-Service Program". Unpublished Ph.D. thesis, United States International University, 1968. University Microfilm 69-19,826.
- Jenks, Houston C. "A Study of Innovation Adoption by Teachers from a Consortium of Schools". Unpublished Ph.D. thesis, University of Texas, 1968. University Microfilm 68-16,100. (AAAS)
- Schmidt, Frederick B. "The Influence of a Summer Institute in Inquiry-Centered Science Education upon the Teaching Strategies of Elementary Teachers in Two Disciplines". Unpublished Ph.D. thesis, University of Oklahoma, 1969. University Microfilm 69-21,989.

8.7 receivers - institutions

- Camaren, Reuben J. "Innovation as a Factor Influencing the Diffusion and Adoption Process". Unpublished Ed.D. thesis, University of California, Berkeley, 1966. University Microfilm 66-8241. (PSSC)
- Overly, Donald E. "Comparative Analysis of North Central Accredited Indiana Secondary Schools in Relation to Educational Innovations". Unpublished Ed.D. thesis, Indiana University, 1968. University Microfilm 68-17,286. (PSSC, CHEM)

Yegge, John F. "The Adoption of an Innovation in Physics Teaching". Unpublished Ph.D. thesis, Harvard University, 1971. 72-2599/ ED 052 961** (HPP)

Zukowski, John. "A Study of Innovation in Science Education in the Detroit Public School System, 1958-67". Unpublished Ed.D. thesis, Wayne State University 1969. University Microfilm 70-3446. (BSCS, PSSC, CHEM, IPS)

8.8 receivers - systems

Peterson, Irving M. "Relationships between School Superintendents Personality Orientations, Perceived Situational Pressures, and Innovativeness". Unpublished Ed.D. thesis, Rutgers State University, 1968. University Microfilm 69-1053. (BSCS, CBA, CHEM, PSSC)

8.9 effects

Bainbridge, J.W. ed. Experience, Experiment and Explanation: a Summary of Nuffield Science Trials in Northumberland 1963-68. Newcastle upon Tyne: Northumberland County Council, 1966.

Holdway, P.H. "A-level Papers in Biology as Tests of Scientific Thinking". Journal of Biological Education, 2 (1968) 207-218

Hurd, Paul DeHart. "The changing philosophy of secondary school science". Paper presented at the AAAS conference July, 1970. ED 045 398.

Kerins, C.T. and others. "Demonstration process factors leading to adoption of innovation". Paper presented at AERA conference, February 1971. ED 047 417.

Newton, David E.; Watson, Fletcher G. The Research on Science Education Survey. The Status of Teacher Education Programs in the Sciences, 1965-67. Harvard Graduate School of Education, 1968.

Strauss, Samuel. "An Analysis of Published Evaluations of BSCS". Unpublished paper presented at the meeting of the National Association for Research in Science Teaching, March 8, 1970. ERIC Report ED 039 127.

Thorpe, C.W. Nuffield 'O' Level Science in the Southwest. The Institute of Education, Exeter University, 1970.

Van Deventer, W.C. "Toward the Teaching of Modern Biology in High School". School Science and Mathematics, 69: 9 (whole 614) (December 1969) 811-816.

Wilson, John H. "The 'New' Science Teachers are Asking More and Better Questions". Journal of Research in Science Teaching, 6 (1969) 49-53.

** Yegge, J.F.; Watson, F.G.; Winter, S.S. The decision-making process in the adoption of a new physics course in American high schools. Harvard Graduate School of Education, May 1971 ED 052 961

9. studies of change in special programmes in education

Skinner, Vincent P. "Night sweeps the north country. A document for the implementation of innovative preschool programs for lower socio-economic background main children: implications for the design and creation of change for northern New England". 1970. ED 041 673.

10. studies of change in social sciences education

Fox, Robert; Girault, Emily; Lippitt, Ronald; Schaible, Lucille. "In-service Teacher Education to Support Utilization of New Social Science Curricula". Unpublished report 125 of the Social Science Education Consortium, Boulder, Colorado, November 1967. ERIC Report ED 039 160.

11. studies of change in humanities education

Foster, William R. "The Elementary School Principal and His Relationship to Reading Curriculum Change". Unpublished Ed.D. thesis, Wayne State University, 1968. University Microfilm 69-6067.

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